

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER
TREATMENT PLANT

TABLE OF CONTENTS

INTRODUCTION	1
BACKGROUND INFORMATION	2
DESCRIPTION OF THE FACILITY	2
History	2
Collection System Status	2
Treatment Processes	3
Discharge Outfall	3
Residual Solids	3
PERMIT STATUS	4
SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT	4
WASTEWATER CHARACTERIZATION	4
SEPA COMPLIANCE	5
PROPOSED PERMIT LIMITATIONS	5
DESIGN CRITERIA	6
TECHNOLOGY-BASED EFFLUENT LIMITATIONS	6
SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS	7
Numerical Criteria for the Protection of Aquatic Life	8
Numerical Criteria for the Protection of Human Health	8
Narrative Criteria	8
Antidegradation	8
Critical Conditions	8
Mixing Zones	9
Description of the Receiving Water	9
Surface Water Quality Criteria	9
Consideration of Surface Water Quality-Based Limits for Numeric Criteria	10
Whole Effluent Toxicity	12
Human Health	12
Sediment Quality	12
GROUND WATER QUALITY LIMITATIONS	12
COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT ISSUED IN 1995	13
MONITORING REQUIREMENTS	13
LAB ACCREDITATION	14
OTHER PERMIT CONDITIONS	14
REPORTING AND RECORDKEEPING	14
PREVENTION OF FACILITY OVERLOADING	14
OPERATION AND MAINTENANCE (O&M)	14
RESIDUAL SOLIDS HANDLING	14
PRETREATMENT	14
DUTY TO ENFORCE DISCHARGE PROHIBITIONS	15
SUPPORT BY THE DEPARTMENT FOR DEVELOPING PARTIAL PRETREATMENT PROGRAM BY POTW	15
OUTFALL EVALUATION	15
GENERAL CONDITIONS	15

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

PERMIT ISSUANCE PROCEDURES	15
PERMIT MODIFICATIONS	15
RECOMMENDATION FOR PERMIT ISSUANCE	16
REFERENCES FOR TEXT AND APPENDICES.....	17
APPENDIX A--PUBLIC INVOLVEMENT INFORMATION	18
APPENDIX B--GLOSSARY	19
APPENDIX C--TECHNICAL CALCULATIONS	24

INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES) of permits, which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the state of Washington to administer the NPDES permit program. Chapter 90.48 Revised Code of Washington (RCW) defines the Department of Ecology's (Department) authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the state include procedures for issuing permits [Chapter 173-220 Washington Administrative Code (WAC)], technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see [Appendix A--Public Involvement](#) of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

<u>GENERAL INFORMATION</u>	
Applicant	Mason County Department of Utilities & Waste Management
Facility Name and Address	Hartstene Pointe WWTP, PO BOX 578, Shelton WA 98584
Type of Treatment	Sequencing Batch Reactors, Activated Sludge, with Chlorine Disinfection.
Discharge Location	Both final and interim discharges are to Case Inlet. The new discharge location is a 2000 foot extension of the existing outfall. Interim Discharge Location: Latitude: 47° 17' 48" N Longitude: 122° 50' 38" W. Final Discharge Location: Latitude: 47° 17' 43" N Longitude: 122° 50' 19" W.
Water Body ID Number	Old ID number WA-PS-0090 New ID number 1224026474620 (applies to new and old outfall locations.)

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

HISTORY

Hartstene Pointe is a recreational and residential community located on the north end of Hartstene Island. The Hartstene Pointe development began in June of 1970. The original treatment plant treated only to primary removal standards. In 1993 the facility was upgraded to secondary treatment with the current system of sequencing batch reactors.

In 1992 when the project was being upgraded, the County was not able to obtain a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife. A major geoduck shellfish bed is located in the vicinity of the existing outfall. The Squaxin Island Tribe and others regard the geoducks an important resource. The Department of Natural Resources (DNR), Aquatic Lands Division manages the geoduck tracks throughout Puget Sound. The DNR has stated that in the near future they will start charging the Hartstene Pointe yearly for the lost geoduck resources affected by the discharge. The geoducks' estimated value is \$34 million in 1993 dollars. A recent DNR assessment of the geoducks in this bed could cost the community \$650,000 per year.

The Department of Health, which certifies shellfish growing areas, conducted a series of studies that show that an extension of 2000 feet to the existing 650 foot outfall would be required to remove the potential of untreated wastewater from contaminating the geoduck bed (Meriwether, 2004). An extension would also place the outfall beyond the existing maximum harvestable depth of 100 feet. The outfall will be located at a depth of approximately 130 feet (MLLW). There would be an approximate 900-foot separation between the extended outfall and the currently harvestable geoducks.

Several meetings were held with all interested parties over the last several years. Several options have been examined from land-based discharges to membrane bioreactors and outfalls in different locations. It appears that the best and least expensive alternative is the 2000-foot outfall extension. On October 29, 2004, the Department approved the "Hartstene Pointe Amendment to Engineering Report." The report describes the new outfall.

The Hartstene Pointe development has 534 lots, 350 of which have houses on them. The wastewater treatment plant was designed for a full build out of 1,350 people. The current population is 860. There are no commercial or industrial developments at Hartstene Pointe.

COLLECTION SYSTEM STATUS

The Hartstene Pointe WWTP collection system was constructed between 1970 and 1973 and has 60,200 feet of gravity sewers and force mains, 113 manholes, and three lift stations. The Infiltration and Inflow (I/I) has been a long-standing problem with this collection system. A 1990 study showed serious problems. In 1996-1998 the I/I was estimated to be 57 percent of the plant flow during the dry season and 81 percent during the peak month (G&O, 2004). Because these flows are considered excessive, the county will need to continue with an aggressive I/I program. Therefore the permit will continue to require I/I reporting.

TREATMENT PROCESSES

The raw wastewater enters the treatment plant headworks where a bar screen traps large solids and a grit chamber is used to settle out sand, gravel, and other dense inert material. There is a 24-hour influent sampler positioned at end of the grit chamber.

The flow passes through a Parshall flume flow meter before entering one of the sequencing batch reactors (SBRs). The SBRs alternate so that one reactor is always filling and or digesting while the other is settling and then decanting. The SBRs use the activated sludge process where the raw water is contacted with the activated sludge mixed liquor and aerated. After a digestion period, the mixed liquor is allowed to settle. The liquid supernatant is then sent through a flow meter and then to a chlorine contact chamber. The chlorine is fed to an in-line static mixer. A 24-hour sampler is located at the effluent end of the chlorine contact chamber. The effluent is then pumped to the outfall in Case Inlet.

The plant discharges on average 20-minutes in the summer and cycles every 75 minutes, which equals 3.2 hours per day of discharge. The discharge time is longer in the winter and discharges for a total of 6.4 hours per day. A schematic, plan view, and map of Hartstene Pointe are shown in Appendix C.

A portion of the solids that have settled out are pumped (wasted) to an aerobic sludge digester on a regular basis.

There are no industrial or commercial users on the Hartstene Pointe system. The facility is classified as a class II level activated sludge plant. The operator is therefore required to have a group II certificate. The lead operator has a group III certification. A second operator spends half of his time at the Rustlewood plant and half of his time at the Hartstene Pointe Plant.

The plant is staffed Monday through Friday from 8:00 to 4:30 and on the weekends the plant is visited for two-hours per day.

The funding for the outfall extension is proposed to be funded through a loan from the Department. As of the writing of this fact sheet, Mason County is proposed to receive a State Revolving Fund loan of \$662,500 for the outfall extension. This funding is still subject to legislative funding and public review.

DISCHARGE OUTFALL

The current outfall is constructed of 8-inch PVC pipe for the first 250 feet to the beach, then 6-inch pipe for the 625 feet from the shore. Most of the existing outfall pipe was installed below grade except for the diffuser which was secured with concrete anchor blocks. There is a “y” diffuser constructed of 6-inch pipe at the end.

The proposed outfall extension will use 8-inch HDPE pipe for an additional 2000 feet. The diffuser will be constructed of 6-inch HDPE pipe configured in a “y” shape with a spread of 10-feet and there will be two 4-inch diameter ports. The proposal is for secondary treated and disinfected effluent to be discharged from the facility to Case Inlet.

RESIDUAL SOLIDS

The sludge waste from the SBRs is sent to an aerobic digester. Digested sludge is hauled to be land applied at a permitted beneficial use facility. This facility was last noted as “Biorecycling” located in

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

Lewis County. The treatment plant removes solids during the treatment of the wastewater at the headworks (grit and screenings), and during the clarifying process, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local solid waste transfer station for ultimate disposal.

PERMIT STATUS

The previous permit for this facility was issued on March 24, 1995. The previous permit placed effluent limitations on five-day Biochemical Oxygen Demand (BOD₅), Total Suspended Solids (TSS), pH, Fecal Coliform bacteria, and had a narrative chlorine limit.

An application for permit renewal was submitted to the Department on March 1, 2000. This permit has taken so long to rewrite because the conditions of the outfall have taken so long to resolve. It has not been clear until now that the facility would extend its outfall and continue to use the existing treatment works.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last inspection on August 4, 2003. The facility appeared to be operating well with no problems at the time.

The Permittee has done a fairly good job over the last three years in remaining in compliance with the permit, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department. The facility has had some difficulty with flow due to I/I problems. There have been a couple of instances of low pH. However, the BOD and TSS have been very low. The BOD and TSS removed from the influent has on average been 98 to 97 percent removal.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The effluent is characterized as follows:

Table 1: Wastewater Characterization (October 2001 to September 2004)

<u>Parameter</u>	<u>Concentration</u>	<u>Old Permit Limit</u>
Influent Flow	0.842 mgd daily max 0.172 mgd (max monthly avg) 0.037 mgd (dry season avg)	0.565 mgd peak hour flow 0.186 mgd max monthly avg
BOD ₅	3.92 mg/L (avg monthly) 1.53 lbs/d (avg monthly) 98% removal (avg monthly)	30 mg/L 46.5 lbs/d 85% removal minimum
TSS	2.81 mg/L (avg monthly) 1.83 lbs/d (avg monthly) 97.1% removal (avg monthly)	30 mg/L 46.5 lbs/d 85% removal minimum
Fecal Coliform	2.9 col/100 ml (geomean) 96 col/100 ml (maximum)	200 col/100 ml monthly
pH	6.15 SU (5 th percentile) 7.08 SU (95 th percentile)	6.0 to 9.0
Chlorine	0.15 mg/L (avg) 0.24 mg/L (95 th percentile)	Narrative limit
Temperature	20.68° C (95 th percentile) 10.62° C (5 th percentile)	No permit limit

The data used to generate this table was based on the last three years of records. The facility clearly has some problems with flow. The maximum day flow of 0.842 mgd was greater than the 0.565 mgd that the facility was designed to handle on a peak hourly flow. (The design criteria are shown below in Table 2). The facility also had a flow, based on a monthly maximum average, of 0.171 mgd, that was greater than 85 percent of the 0.186 mgd that the facility was designed handle as a maximum monthly average flow. The excessive flow is most likely from infiltration and inflow (I/I).

The BOD, TSS, pH, and fecal coliform are all fairly low and appear to be well controlled. The chlorine is the only toxic pollutant known at this time to be in the effluent. Ammonia is a toxic pollutant typical of municipal discharges, however, there have been no samples taken in the last five years. It may be beneficial to monitor ammonia in the new permit.

As stated there are no industrial or commercial inputs to the sewage works. This community is domestic in nature and therefore other toxic substances are not expected.

SEPA COMPLIANCE

The Facility Plan was recently completed (G&O, 2004) which requires State Environmental Policy Act (SEPA) review. No other activity is expected that will require SEPA compliance at this time.

PROPOSED PERMIT LIMITATIONS

Federal and state regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most

stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the state of Washington were determined and included in this permit. The Department does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the Permittee is required to notify the Department. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for this treatment facility are taken from the *Hartstene Pointe Amendment to Engineering Report Wastewater Facilities* prepared by Gray and Osborne, Inc (G&O, 2004) and are as follows:

Table 2: Design Standards for Hartstene Pointe WWTP.

Parameter	Design Quantity
Monthly average flow (max. month)	0.186 MGD
Peak daily flow	0.342 MGD
Instantaneous peak flow (hourly)	0.505 MGD
BOD ₅ influent loading	270 lb./day
TSS influent loading	270 lb./day

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by federal and state regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD₅, and TSS are taken from Chapter 173-221 WAC are:

Table 3: Technology-based Limits.

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 ml Weekly Geometric Mean = 400 organisms/100 ml

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

Parameter	Limit
BOD ₅ (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Chlorine	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

The technology-based monthly average limitation for chlorine is derived from standard operating practices. The Water Pollution Control Federation's Chlorination of Wastewater (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/liter chlorine residual is maintained after 15 minutes of contact time. See also Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, Third Edition, 1991. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/liter chlorine limit on a monthly average basis. According to WAC 173-221-030(11)(b), the corresponding weekly average is 0.75 mg/liter.

The existing permit has a narrative chlorine limit that reads: "Total available (residual) chlorine shall be maintained which is sufficient to attain the fecal coliform limits specified above. Chlorine concentrations in excess of that necessary to reliably achieve these limits shall be avoided. The proposed permit includes the technology based chlorine limit as a minimum. The toxicity of chlorine and a potential water quality based limit for chlorine will be discussed later.

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

Monthly effluent mass loadings (lbs/day) were calculated as the maximum monthly influent design loading (270 lbs/day) x 0.15 = 41 lbs/day.

There are two methods for calculating the mass loading limits and the most stringent of the two methods is then supposed to become the limit. The old permit used the incorrect method which results in a less stringent limit of 46.5 lbs/day. Therefore the new permit will have the effluent mass limit of 41 lbs/day. The weekly limit below is based on the new monthly limit. As shown in the characterization above, the facility should have no trouble meeting these limits

The weekly average effluent mass loading is calculated as 1.5 x monthly loading = 61.5 lbs/day.

SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state. Water quality-based effluent limitations may be based on an individual

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

NUMERICAL CRITERIA FOR THE PROTECTION OF AQUATIC LIFE

"Numerical" water quality criteria are numerical values set forth in the state of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

NUMERICAL CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

The state was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

NARRATIVE CRITERIA

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

ANTIDEGRADATION

The state of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in the proposed permit. The discharges authorized by this proposed permit should not cause a loss of beneficial uses.

The 1998 303(d) list has several listings for parameters in Case Inlet and Dana Passage. Temperature excursions were noted at station CSE-001; however, they were determined to be natural conditions. There were pH excursions that were not placed on the list because there was no evidence of human caused problems. Fecal Coliform was placed on the list for outlying areas in relation to the Hartstene Point area. Dissolved Oxygen was listed on the 1998 303(d) list at station CSC001 near Hartstene Point. It was determined that a TMDL was needed. No TMDL is scheduled, however, for this area at this time.

CRITICAL CONDITIONS

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

MIXING ZONES

The Water Quality Standards allow the Department to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of WAC 173-201A-100.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

A more complete description of the dilution factor modeling is discussed later in this fact sheet.

DESCRIPTION OF THE RECEIVING WATER

The facility discharges to Case Inlet in Puget Sound which is designated as a Class AA receiving water in the vicinity of the outfall. Other nearby point source outfalls are all more than a mile away. The next nearest outfall to the Hartstene Point outfall is from the Rustlewood POTW which is around the northern point of Hartstene Island in Pickering Passage and isolated from the Hartstene Pointe outfall. Nearby non-point sources of pollutants include runoff from possible failing septic systems and agricultural activity on Hartstene Island. None of the sources appear to be significant and with the proposed outfall extending 2600 feet from shore it is unlikely that background anywhere near the outfall will be influenced by these sources.

Characteristic uses include the following:

Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses.

SURFACE WATER QUALITY CRITERIA

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Fecal Coliforms	14 colonies/100 ml maximum geometric mean and not more than 10% of the samples used to calculate the geometric mean exceeding 43 colonies/100 ml
Dissolved Oxygen	7.0 mg/L minimum
Temperature	13.0 degrees Celsius maximum or incremental increases above background
pH	7.0 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix C for numeric criteria for toxics of concern for this discharge)

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

CONSIDERATION OF SURFACE WATER QUALITY-BASED LIMITS FOR NUMERIC CRITERIA

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which the Department has determined to be AKART. A mixing zone is authorized in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC and are defined as follows:

The dilution factors of effluent to receiving water that occur within these zones have been determined at the critical condition. The old existing outfall has not been remodeled. The old dilution factors were found in the old permit. The dilution factors for the new outfall were determined by the use of Visual Plumes which uses the UM3 computer dilution model. A report on the dilution factor modeling for the proposed outfall extension may be found in Appendix C. The old dilution factors and the results of the modeling for the proposed outfall are shown below.

Old Existing Outfall	Acute	Chronic
Aquatic Life	28	193

New Proposed Outfall	Acute	Chronic
Aquatic Life	44	478

There do not appear to be any toxic or human health concerns at this time.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The proposed outfall extension is to Case Inlet where a critical condition could be assumed to be the summer months for ammonia. Alternatively, fecal coliform may be more abundant in the winter when excessive I/I may increase the fecal contamination. A single critical condition was not determined. Both winter and summer flows were used in the dilution modeling. See Appendix C for the parameters used in the dilution modeling. The ambient background data, with the exception of current velocity, used for this permit includes the following from Department Marine Ambient Monitoring Station CSE-001 near Herron Island south of Dougall Point:

Parameter	Value used
Velocity (ambient)	1.5-30 cm/sec (based on current meter)
Depth	130 feet
Salinity	29.7 ppt at surface to 30.1 ppt at depth
Temperature	Winter: 7.8°C surface to 8.4°C at depth Summer: 16.2°C surface to 13.2°C at depth

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

pH (high)	7.60 (10 th percentile low)
	8.31 (90 th percentile high)
Dissolved Oxygen	7.6 mg/L (10 th percentile)
Total Ammonia-N	0.05 mg/L (90 th percentile)
Fecal Coliform	1 col./100 ml (90 th percentile)
All Other Metals	0.0 (no data--assumed to be below detection limits)

BOD₅--Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, the technology-based effluent limitation for BOD₅ was placed in the permit.

The impact of BOD on the receiving water was evaluated first using simple mixing of dissolved oxygen (DO). Because Hartstene Point did not have any DO data, a value of 3.1 mg/l (from Boston Harbor SBR in Dana Passage) was used as a surrogate effluent value. The immediate drop in DO would be very small (approximately 0.01 mg/L). With the ambient DO around 7.6 for the 10th percentile value there will be little immediate effect. The BOD from Hartstene Pointe is kept very low as shown in the characterization table above which will result in very low long term effect.

This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water. The monitoring has shown that BOD₅ and TSS have been kept low. The monitoring will remain at 1/week.

Temperature--The impact of the discharge on the temperature of the receiving water was modeled by simple mixing analysis at critical condition. The receiving water temperature at the critical condition (summer months) is 16.23°C and the effluent temperature is 20.68°C. The predicted incremental rise in temperature at the edge of the mixing zone is 0.0093°C.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters. Therefore, no effluent limitation for temperature was placed in the proposed permit.

pH--Because of the high buffering capacity of marine water, compliance with the technology-based limits of 6 to 9 will assure compliance with the Water Quality Standards for Surface Waters.

Fecal coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 478.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the Water Quality Standards for Surface Waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: chlorine and ammonia. A reasonable potential analysis (See Appendix C) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

The determination of the reasonable potential for chlorine and ammonia to exceed the water quality criteria was evaluated with procedures given in EPA, 1991 (Appendix C). The parameters used in the critical condition modeling are as follows: acute dilution factor 44, chronic dilution factor 478, receiving water temperature 20.68°C, ambient ammonia of 2.4 µg/L and ambient chlorine of 0 µg/L. The effluent ammonia has not been sampled in the last permit cycle. Therefore, an effluent ammonia value from the previous fact sheet was used. This ammonia value was calculated as a 95th percentile of 9.4 mg/L based on 24 samples. The chlorine effluent value used was 0.24 mg/L based 1098 daily samples. No metals data was available; however, no metals or other toxics are expected from this facility.

No reasonable potential for chlorine or ammonia were found. Therefore the technology based chlorine limit will be used in the permit. Testing for chlorine will need to continue to assure the technology limit is met. These technology limits (as described after table 3) are: an average monthly limit = 0.5 mg/L and an average weekly limit = 0.75 mg/L. Because ammonia has not been monitored for more than five years, the permit will require monitoring of ammonia to report on the next permit renewal application.

WHOLE EFFLUENT TOXICITY

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. Therefore, no whole effluent toxicity testing is required in this permit. The Department may require effluent toxicity testing in the future if it receives information that toxicity may be present in this effluent.

HUMAN HEALTH

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the state by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharge is unlikely to contain chemicals regulated for human health.

SEDIMENT QUALITY

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

COMPARISON OF EFFLUENT LIMITS WITH THE EXISTING PERMIT ISSUED IN 1995

The following table displays the limits from the existing permit and compares them with the proposed limits for the new permit.

Parameter	Existing Limits		Proposed Limits	
	Avg Monthly ^a	Avg Weekly ^a	Avg Monthly ^a	Avg Weekly ^a
BOD ₅	30 mg/L	45 mg/L	30 mg/L	45 mg/L
	46.5 lbs/day	70 lbs/day	41 lbs/day	62 lbs/day
	85% removal		85% removal	
TSS	30 mg/L	45 mg/L	30 mg/L	45 mg/L
	46.5 lbs/day	70 lbs/day	41 lbs/day	62 lbs/day
	85% removal		85% removal	
Fecal Coliform	200 org/100 ml	400 org/100 ml	200 org/100 ml	400 org/100 ml
Chlorine	Narrative limit		0.5 mg/L	0.75 mg/L
pH	Shall not be outside the range 6.0 – 9.0		Shall not be outside the range 6.0 – 9.0	
Footnote	^a The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken, with the exception of fecal coliform, which is based on the geometric mean. Use influent flow rates to calculate concentrations and mass limit.		^a The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken, with the exception of fecal coliform, which is based on the geometric mean. Use influent flow rates to calculate concentrations and mass limit.	

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

Monitoring for ammonia is being required to further characterize the effluent. This pollutant could have a significant impact on the quality of the surface water.

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The monitoring schedule is detailed in the proposed permit under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

consistent with agency guidance given in the current version of the Department's *Permit Writer's Manual* (July 1994) for an activated sludge plant of less than 1 mgd.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. The laboratory at this facility is accredited for: BOD₅, CBOD, total chlorine residual, dissolved oxygen, pH, total suspended solids, and fecal coliform bacteria,

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in proposed permit requirement S.4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow.

OPERATION AND MAINTENANCE (O&M)

The proposed permit contains condition S.5 as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems the Permittee is required in permit condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards, WAC 173-201A, and Biosolids Handling covered under WAC 174-308.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by the Department under Chapter 70.95J RCW and Chapter 173-308 WAC. The disposal of other solid waste is under the jurisdiction of the local County Health Department.

Requirements for monitoring sewage sludge and recordkeeping are included in this permit. This information will be used by the Department to develop or update local limits and is also required under 40 CFR 503.

PRETREATMENT

WAC 173-216-110 requires that a list of prohibitions in WAC 173-216-060 be included in the permit. It is unlikely that the Hartstene Pointe community will have any industry or commercial business that will fall under the pretreatment regulations. The pretreatment program is intended to seek out significant

industrial users and to decide who would have authority over permitting such discharges. However, if at a future time, there are industrial discharges or potentially significant discharges that can upset the POTW, the Permittee may need to conduct an industrial user survey of the dischargers to determine the extent of compliance of all industrial or commercial users of the sanitary sewer. This survey is to determine compliance with federal pretreatment regulations [40 CFR Part 403 and Sections 307(b) and 308 of the Clean Water Act], with state regulations (Chapter 90.48 RCW and Chapter 173-216 WAC), with local ordinances. The permit will include a list of basic discharges that are prohibited from being discharged to the treatment plant without pretreatment as described in the next couple of sub-sections.

Duty to Enforce Discharge Prohibitions

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet.

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases is prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Support by the Department for Developing Partial Pretreatment Program by POTW

The Department has committed to providing technical and legal assistance to the Permittee in fulfilling these joint obligations, in particular assistance with developing an adequate sewer use ordinance, notification procedures, enforcement guidelines, and developing local limits and inspection procedures.

OUTFALL EVALUATION

Proposed permit condition S.8 requires the Permittee to check the outfall after installation to make certain the newly installed outfall remains intact and in working order and to determine if sediment is accumulating in the vicinity of the outfall. The Permittee will be required to submit a report detailing the findings of that inspection.

GENERAL CONDITIONS

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended state or federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. The Department proposes that this permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Beak Consultants Inc.

1989. Hartstene Pointe Outfall Studies. Report No. 21552. Kirkland, Washington

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1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.

1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.

1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.

1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Gray & Osborne, Inc.

2004. Hartstene Pointe, Amendment to Engineering report Wastewater Treatment Facilities. G&O No. 02740. Seattle, WA

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2004. Untitled Draft of Drogue Study to Determine Tidal Drift and Outfall Effect on Shellfish Beds by Washington State Department Health, Olympia, WA.

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition.

Tsivoglou, E.C., and J.R. Wallace.

1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

Laws and Regulations(<http://www.ecy.wa.gov/laws-rules/index.html>)

Permit and Wastewater Related Information

(<http://www.ecy.wa.gov/programs/wq/wastewater/index.html>)

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on May 20, 2004, and May 27, 2004, in the *Shelton/Mason County Journal* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on March 31, 2005, in the *Shelton/Mason County Journal* to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30-day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within 30 days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (360) 407-6554, or by writing to the address listed above.

This permit and fact sheet were written by Eric Schlorff.

APPENDIX B--GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

CBOD₅ – The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celcius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD₅ is given in 40 CFR Part 136.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring --Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial User-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

Pass through -- A discharge which exits the POTW into waters of the--State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

Several of the Excel[®] spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at (<http://www.ecy.wa.gov/programs/wq/wastewater/index.html>)

Calculation of seawater fraction of un-ionized ammonia
from Hampson (1977). Un-ionized ammonia criteria for
salt water are from EPA 440/5-88-004.

Based on Lotus File NH3SALT.WK1 Revised 19-Oct-93

INPUT

- | | |
|-------------------------|------|
| 1. Temperature (deg C): | 16.2 |
| 2. pH: | 8.3 |
| 3. Salinity (g/Kg): | 30.1 |

OUTPUT

- | | |
|--|--------|
| 1. Pressure (atm; EPA criteria assumes 1 atm): | 1.0 |
| 2. Molal Ionic Strength (not valid if >0.85): | 0.619 |
| 3. pKa8 at 25 deg C (Whitfield model "B"): | 9.317 |
| 4. Percent of Total Ammonia Present as Unionized: | 4.868% |
| 5. Unionized ammonia criteria (mg un-ionized NH3 per liter)
from EPA 440/5-88-004 | |
| Acute: | 0.233 |
| Chronic: | 0.035 |
| 6. Total Ammonia Criteria (mg/L as NH3) | |
| Acute: | 4.79 |
| Chronic: | 0.72 |
| 7. Total Ammonia Criteria (mg/L as NH3-N) | |
| Acute: | 3.93 |
| Chronic: | 0.59 |

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

Reasonable potential to exceed state water quality standards

for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56

CALCULATIONS

State Water Quality Standard						Max concentration at edge of...									
Param.	Ambient Conc. ug/L	Acute ug/L	Chronic ug/L	Acute Mixing Zone ug/L	Chronic Mixing Zone ug/L	LIMIT REQ'D?	Effluent percentile value	Pn	Max effluent conc. ug/L	Coeff Var CV	s	# of samp. n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
Ammonia	2.4340	393.0000	59.0000	277.58	27.76	NO	0.95	0.883	9400.00	0.60	0.55	24	1.29	44	478
Chlorine	0	00	7.5000	2.91	0.27	NO	0.95	0.997	240.00	0.60	0.55	1095	0.53	44	478

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

Hartstene Pointe
Dilution Factor Modeling
For Proposed Outfall Extension
December 27, 2004

The dilution modeling discussed in this report was conducted by Eric Schlorff with the Department, Water Quality Program as part of the Hartstene Pointe NPDES permit evaluation.

The Hartstene Pointe Publicly Owned Sewage Works consists of two sequencing batch reactors that discharge through an outfall that currently extends 650 feet from shore. The outfall must be extended an additional 2000 feet in order to allow the harvest shellfish at the current discharge location. The harvesting of shellfish is prohibited by the Department of Health as long as the discharge remains in the current location. This report examines the dilution modeling for the outfall at the proposed location. The report examines the rationale used in choosing the parameters applied to the model, the dilution ratios determined, and the model runs which are attached. The old dilution factors for the original outfall were 28:1 for acute and 193:1 for Chronic.

The outfall extension is expected to be completed in the next year. The discharge outfall will be located in approximately 127 to 130 feet below the surface at MLLW. A value of 130 was used as the depth of the outfall in the model.

The ambient current was determined in a 1989 study by Beak Consultants. A current meter was placed in the vicinity of the existing outfall for 16 days. This data appears to be the best information available at this time and should and it is assumed that the currents seen at the proposed new location will be fairly close to those at the old location. The raw data from the original report was not available; however, table 1 from this Beak report contained the following information:

Table 1: current speeds from Beak 1989

Speed (cm/sec)	Total Percentage of Occurrence
1.5	24.76
2.5	3.47
5.0	9.16
7.5	9.26
10.0	8.08
15.0	11.78
20.0	10.74
25.0	8.62
30.0	7.66
35.0	3.62
40.0	1.7
45.0	.71
50.0	.22
75.0	.05

From this information it was possible to multiply out the speeds by the totals and thereby determine the 10th, 50th, and 90th percentiles required by the Department's guidance on dilution modeling. The table also contained probability information on current direction and showed that the current traveled to the north northeast 78 percent of the time and to the southeast to southwest 13 percent of the time. The percentiles used in the dilution modeling are shown as follows:

Table 2: Current Velocities Required for Modeling by Ecology Guidance

10 th percentile velocity	1.5 cm/s	Acute dilution
50 th percentile velocity	10.0 cm/s	Chronic dilution
90 th percentile velocity	30 cm/s	Acute dilution

The proposed outfall will have a “Y” at the end to allow for a two-port diffuser. There will be two four-inch ports that are 10 feet apart. It was assumed that both ports will be aimed in the direction of the predominant flow to the north-northeast (NNE) (e.g., one port would be 10 feet ESE of the other port and both aimed to the NNE). This port alignment should give the best dilution.

As shown in table 2 above, the acute dilution requires both the 10th and 90th percentile velocities and the chronic dilution requires the 50th percentile velocity.

Effluent discharge flows were determined from three years of Discharge Monthly Record (DMR) data. The plant flows were entered into a spreadsheet for October 2001 through September 2004. It was determined from this data that the facility is operating within 85 percent of design flow most of the time. The average dry weather flow was 0.037 mgd. This amounts to 38 percent of the dry weather design flow shown below. However, because of excessive I/I flows, there are periods when the facility has exceeded 100 percent of the design capacity. For instance the design parameters for the plant are:

Design Flows

Monthly avg for max month	0.186
Monthly avg for dry weather flow	0.097
Instantaneous peak flow	0.565

The plant influent flow was 0.84 mgd and effluent flow was 0.64 mgd on October 20, 2003, exceeding instantaneous peak flow of 0.565 mgd for the plant.

The Permit Writers Manual guidance for dilution modeling states that the plant flow to use for acute dilution should be based on the “highest daily maximum flow” in the critical season. The critical season for Case Inlet could be either the summer or winter season depending on what parameter is of concern. This has not been determined. E.g., ammonia would likely be more toxic in the summer months when the temperatures in the receiving water are highest; however, fecal coliform would likely be higher in the winter with the excessive flows. For this reason, high and low acute flows were run in the model as well as a high and low chronic flow. The chronic flow to use is based on the “highest monthly average flow” during summer and winter months.

The operators of the SBR system at Hartstene Pointe determined that the plant discharges on average for 20 minutes per 75 min cycle in the summer. This amounts to 3.2 hours per day in summer and 6.4 hours per day in the winter. These hours were used to convert the plant flow from gallons per day (mgd) to cubic feet per second (cfs). The flow in cfs more accurately describes the flow from the SBR plant. The flows used are shown below

The acute highest daily summer flow was $0.152 \text{ mgd} / 3.2 \text{ hrs} = 0.0475 \text{ mg/hr} = 1.764 \text{ cfs}$

The acute highest daily winter flow was $0.640 \text{ mgd} / 6.4 \text{ hrs} = 0.10 \text{ mg/hr} = 3.713 \text{ cfs}$

The chronic summer flow was $0.046 \text{ mgd} / 3.2 \text{ hrs} = 0.0144 \text{ mg/h} = 0.534 \text{ cfs}$

The chronic winter flow was $0.172 \text{ mgd} / 6.4 \text{ hrs} = 0.02389 \text{ mg/h} = 0.998 \text{ cfs}$

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

The effluent temperature used in this modeling was also based on actual DMR data. A 95th percentile effluent temperature was used to represent the summer months and amounted to 20.68° C. The winter effluent temperature was based on the 5th percentile and amounted to 10.62° C.

The ambient temperature and salinity were based on data recorded by the Department's Environmental Assessment Station CSE-001 located near Heron Island. This station is located in the mid-channel of Case Inlet a couple of miles south of the proposed outfall location. The data from this station contained monthly temperature and salinity profiles from November 1989 to December 1999. A 10th percentile and 90th percentile salinity profile for the top 43 meters (approximately the depth of the proposed outfall) were used. The difference between the 10th and 90th percentile salinity profiles was about 3 parts per thousand (ppt) which was determined to not be a great enough difference to justify running separate model scenarios for a low and high salinity. Therefore, the 90th percentile higher salinity profile was used. The 90th percentile salinity ranged from 29.7 ppt near the surface to 30.1 ppt at 43 meters. The ambient temperature profiles were determined using the same Heron Island station CSE 001 data. A 10th percentile temperature profile that ranged from 7.8° C near the surface to 8.4° C at depth was used for the winter model runs. A 90th percentile temperature profile that ranged from 16.2° C near the surface to 13.2° C at depth was used for the summer model runs.

The following table represents the data inputs and the resultant dilution for each model run.

Table 2: Model inputs and dilution

Model Run	Salinity (ppt)	Ambient Temperature (°C)	Effluent Flow (cfs)	Ambient Velocity (cm/s)	Effluent Temperature (°C)	Acute Dilution	Chronic Dilution
1	29.7 – 30.1	7.8 – 8.4	1.764	1.5	10.62	110	
2	“	“	0.534	10.0	“		1509
3	“	“	1.764	30.0	“	81	
4	“	“	3.713	1.5	“	44	
5	“	“	0.998	10.0	“		835
6	“	“	3.713	30.0	“	50	
7	“	16.2 – 13.2	1.764	1.5	20.68	104	
8	“	“	0.534	10.0	“		667
9	“	“	1.764	30.0	“	82	
10	“	“	3.713	1.5	“	45	
11	“	“	0.998	10	“		478
12	“		3.713	30.0	“	51	

The Department guidance requires that the model be calculated for an ambient velocity at the 10th and 90th percentiles where as the chronic dilution is calculated only at the 50th percentile of ambient velocity. Therefore there are twice as many acute dilution runs shown above as chronic dilution runs.

The lowest dilutions from the model runs indicate an acute dilution of 44:1 and a chronic dilution of 478:1.

The dilution ratios were modeled with Visual Plumes which used the UM3 model. The text of the dilution model outputs are attached below.

The effluent plume appears to reach a trapping level and then overlapping in several model runs. The overlapping only makes a difference in the far field chronic dilution model runs because the overlapping only begins to occur well beyond the acute zone. The only dilution run where the overlapping causes a

problem is in model run number 11 which was chosen to represent the chronic dilution. All other chronic dilution runs are higher. The main problem with the overlapping is that the dilution may be over predicted. The overlapping would limit the final dilution beyond the point of overlap. The overlapping was seen in model runs 2, 7, 10, and 11. The overlapping indicates a disintegration of the plume due to low current velocity and low effluent flow. Because other values are not available, I will continue to use the lowest model predicted chronic value of 478:1 with the following caveat: Although this dilution factor appears to be lowest of all model runs, the actual dilution may be lower.

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 3:38:31 PM

Case 1; ambient file C:\Plumes\Hartstone Run #1.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.015	90.0	29.7	7.8	0.0	0.0	0.015	90.0	0.0003
1.0	0.015	90.0	29.71	7.814	0.0	0.0	0.015	90.0	0.0003
5.0	0.015	90.0	29.75	7.87	0.0	0.0	0.015	90.0	0.0003
10.0	0.015	90.0	29.79	7.94	0.0	0.0	0.015	90.0	0.0003
15.0	0.015	90.0	29.84	8.009	0.0	0.0	0.015	90.0	0.0003
20.0	0.015	90.0	29.89	8.079	0.0	0.0	0.015	90.0	0.0003
25.0	0.015	90.0	29.93	8.149	0.0	0.0	0.015	90.0	0.0003
30.0	0.015	90.0	29.98	8.219	0.0	0.0	0.015	90.0	0.0003
35.0	0.015	90.0	30.03	8.288	0.0	0.0	0.015	90.0	0.0003
40.0	0.015	90.0	30.07	8.358	0.0	0.0	0.015	90.0	0.0003
43.0	0.015	90.0	30.1	8.4	0.0	0.0	0.015	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrnCMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	1.764	0.0	10.62	100.0

Froude number: 20.05

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrnCMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	1.5	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	1.5	4.039	33.0	330.0	98.04	1.02	0.0	0.016; bottom hit,
100	129.7	1.5	27.86	33.0	330.0	13.8	7.1	0.0	5.02; axial vel 0.00198
200	116.7	1.5	97.22	33.0	330.0	2.582	37.85	0.0	20.47;
219	108.8	1.5	120.6	33.0	330.0	1.773	55.13	0.0	24.08; merging,
254	78.18	1.5	202.0	33.0	330.0	0.886	110.2	0.0	33.04; acute zone,
289	6.463	1.5	463.4	33.0	330.0	0.443	220.5	0.0	47.41; trap level,
290	3.218	1.5	480.8	33.0	330.0	0.435	224.9	0.0	48.06; surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 15.26 m

conc	dilutn	width	distnce	time					
(%)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(cm/s)	(m0.67/s2)	
0.21823	453.0	42.36	100.6	1.591	0.0	0.0	1.5	3.00E-4	

count: 1

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3:38:32 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 11:05:09 AM

Case 1; ambient file C:\Plumes\Hartstone Run #2 text.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn			
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2			
0.0	0.1	90.0	29.7	7.8	0.0	0.0	0.1	90.0	0.0003			
1.0	0.1	90.0	29.6	7.814	0.0	0.0	0.1	90.0	0.0003			
5.0	0.1	90.0	29.8	7.87	0.0	0.0	0.1	90.0	0.0003			
10.0	0.1	90.0	29.9	7.94	0.0	0.0	0.1	90.0	0.0003			
15.0	0.1	90.0	29.9	8.009	0.0	0.0	0.1	90.0	0.0003			
20.0	0.1	90.0	29.9	8.079	0.0	0.0	0.1	90.0	0.0003			
25.0	0.1	90.0	30.0	8.149	0.0	0.0	0.1	90.0	0.0003			
30.0	0.1	90.0	30.0	8.219	0.0	0.0	0.1	90.0	0.0003			
35.0	0.1	90.0	30.0	8.288	0.0	0.0	0.1	90.0	0.0003			
40.0	0.1	90.0	30.1	8.358	0.0	0.0	0.1	90.0	0.0003			
43.0	0.1	90.0	30.1	8.4	0.0	0.0	0.1	90.0	0.0003			
P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrnMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	0.534	0.0	10.62	100.0
Froude number: 6.068												
Step	Depth	Amb-cur	P-dia	ChrnMZ	Polutnt	Dilutn	x-posn	y-posn				
	(ft)	(cm/s)	(in)	(ft)	(%)	()	(ft)	(ft)				
0	130.0	10.0	4.0	330.0	100.0	1.0	0.0	0.0;				
1	130.0	10.0	4.039	330.0	98.04	1.02	0.0	0.0179; bottom hit,				
100	128.9	10.0	20.72	330.0	13.8	7.1	0.0	4.074;				
200	123.4	10.0	72.72	330.0	1.905	51.29	0.0	11.54;				
244	119.3	10.0	120.8	330.0	0.797	122.6	0.0	17.65; merging,				
290	110.8	10.0	261.9	330.0	0.321	304.7	0.0	33.16; acute zone,				
300	107.6	10.0	317.5	330.0	0.263	371.5	0.0	39.24;				
354	72.84	10.0	900.5	330.0	0.0903	1082.2	0.0	103.4; axial vel	0.0295	trap level,		
367	65.75	10.0	1152.6	330.0	0.0758	1288.2	0.0	118.8; begin overlap,				
393	59.93	10.0	1446.2	330.0	0.0649	1504.6	0.0	145.1; surface, end overlap,				
Const Eddy Diffusivity. Farfield dispersion based on wastefield width of										39.78 m		
conc	dilutn	width	distance	time								
(%)		(m)	(m)	(hrs)	(col/dl)	(d-1)	(cm/s)	(m0.67/s2)				
6.48E-2	1507.6	40.48	50.0	0.016	0.0	0.0	10.0	3.00E-4				
6.49E-2	1506.0	41.67	60.0	0.0438	0.0	0.0	10.0	3.00E-4				
6.49E-2	1505.4	42.83	70.0	0.0716	0.0	0.0	10.0	3.00E-4				
6.49E-2	1505.4	43.96	80.0	0.0993	0.0	0.0	10.0	3.00E-4				
6.49E-2	1506.5	45.06	90.0	0.127	0.0	0.0	10.0	3.00E-4				
6.47E-2	1509.4	46.13	100.0	0.155	0.0	0.0	10.0	3.00E-4				
6.45E-2	1514.7	47.18	110.0	0.183	0.0	0.0	10.0	3.00E-4				

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 10:53:11 AM

Case 1; ambient file C:\Plumes\Hartstone Run #3.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.3	90.0	29.7	7.8	0.0	0.0	0.3	90.0	0.0003
1.0	0.3	90.0	29.71	7.814	0.0	0.0	0.3	90.0	0.0003
5.0	0.3	90.0	29.75	7.87	0.0	0.0	0.3	90.0	0.0003
10.0	0.3	90.0	29.79	7.94	0.0	0.0	0.3	90.0	0.0003
15.0	0.3	90.0	29.84	8.009	0.0	0.0	0.3	90.0	0.0003
20.0	0.3	90.0	29.89	8.079	0.0	0.0	0.3	90.0	0.0003
25.0	0.3	90.0	29.93	8.149	0.0	0.0	0.3	90.0	0.0003
30.0	0.3	90.0	29.98	8.219	0.0	0.0	0.3	90.0	0.0003
35.0	0.3	90.0	30.03	8.288	0.0	0.0	0.3	90.0	0.0003
40.0	0.3	90.0	30.07	8.358	0.0	0.0	0.3	90.0	0.0003
43.0	0.3	90.0	30.1	8.4	0.0	0.0	0.3	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrnMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	1.764	0.0	10.62	100.0

Froude number: 20.05

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrnMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	30.0	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	30.0	4.039	33.0	330.0	98.04	1.02	0.0	0.0177; bottom hit,
100	129.9	30.0	22.47	33.0	330.0	13.8	7.1	0.0	4.797; axial vel 0.00247
200	126.5	30.0	83.71	33.0	330.0	1.905	51.29	0.0	25.3;
223	125.0	30.0	108.2	33.0	330.0	1.208	80.87	0.0	33.27; axial vel 0.00613 acute zone,
233	124.2	30.0	120.7	33.0	330.0	0.991	98.58	0.0	37.46; merging,
300	111.8	30.0	383.2	33.0	330.0	0.263	371.5	0.0	107.4;
340	91.71	30.0	850.5	33.0	330.0	0.119	820.2	0.0	239.2; trap level,
353	81.74	30.0	1107.0	33.0	330.0	0.0921	1061.0	0.0	339.1; chronic zone,
361	77.86	30.0	1272.0	33.0	330.0	0.0812	1202.8	0.0	457.7; local maximum rise or fall,

;

10:53:12 AM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 2:28:46 PM

Case 1; ambient file C:\Plumes\Hartstene Run #4.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.015	90.0	29.7	7.8	0.0	0.0	0.015	90.0	0.0003
1.0	0.015	90.0	29.71	7.814	0.0	0.0	0.015	90.0	0.0003
5.0	0.015	90.0	29.75	7.87	0.0	0.0	0.015	90.0	0.0003
10.0	0.015	90.0	29.79	7.94	0.0	0.0	0.015	90.0	0.0003
15.0	0.015	90.0	29.84	8.009	0.0	0.0	0.015	90.0	0.0003
20.0	0.015	90.0	29.89	8.079	0.0	0.0	0.015	90.0	0.0003
25.0	0.015	90.0	29.93	8.149	0.0	0.0	0.015	90.0	0.0003
30.0	0.015	90.0	29.98	8.219	0.0	0.0	0.015	90.0	0.0003
35.0	0.015	90.0	30.03	8.288	0.0	0.0	0.015	90.0	0.0003
40.0	0.015	90.0	30.07	8.358	0.0	0.0	0.015	90.0	0.0003
43.0	0.015	90.0	30.1	8.4	0.0	0.0	0.015	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrnMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	3.713	0.0	10.62	100.0

Froude number: 42.21

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrnMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	1.5	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	1.5	4.039	33.0	330.0	98.04	1.02	0.0	0.016; bottom hit,
100	129.9	1.5	28.2	33.0	330.0	13.8	7.1	0.0	5.055; axial vel 0.00411
185	124.2	1.5	120.9	33.0	330.0	2.88	33.94	0.0	25.47; merging,
200	120.6	1.5	138.6	33.0	330.0	2.432	40.19	0.0	30.06;
209	117.7	1.5	149.6	33.0	330.0	2.204	44.35	0.0	33.11; acute zone,
281	4.318	1.5	502.3	33.0	330.0	0.62	157.5	0.0	78.43; surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 15.81 m

conc	dilutn	width	distnce	time
(%)	(m)	(m)	(hrs)	(kg/kg)
0.3301	299.2	41.35	100.6	1.42

count: 1

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2:28:48 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 3:34:38 PM

Case 1; ambient file C:\Plumes\Hartstene Run #5.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.1	90.0	29.7	7.8	0.0	0.0	0.1	90.0	0.0003
1.0	0.1	90.0	29.71	7.814	0.0	0.0	0.1	90.0	0.0003
5.0	0.1	90.0	29.75	7.87	0.0	0.0	0.1	90.0	0.0003
10.0	0.1	90.0	29.79	7.94	0.0	0.0	0.1	90.0	0.0003
15.0	0.1	90.0	29.84	8.009	0.0	0.0	0.1	90.0	0.0003
20.0	0.1	90.0	29.89	8.079	0.0	0.0	0.1	90.0	0.0003
25.0	0.1	90.0	29.93	8.149	0.0	0.0	0.1	90.0	0.0003
30.0	0.1	90.0	29.98	8.219	0.0	0.0	0.1	90.0	0.0003
35.0	0.1	90.0	30.03	8.288	0.0	0.0	0.1	90.0	0.0003
40.0	0.1	90.0	30.07	8.358	0.0	0.0	0.1	90.0	0.0003
43.0	0.1	90.0	30.1	8.4	0.0	0.0	0.1	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	0.998	0.0	10.62	100.0

Froude number: 11.35

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrncMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	10.0	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	10.0	4.039	33.0	330.0	98.04	1.02	0.0	0.017; bottom hit,
100	129.4	10.0	24.04	33.0	330.0	13.8	7.1	0.0	4.766;
200	122.0	10.0	92.66	33.0	330.0	1.905	51.29	0.0	16.94;
222	119.1	10.0	121.0	33.0	330.0	1.232	79.29	0.0	20.62; merging,
263	109.7	10.0	246.1	33.0	330.0	0.547	178.5	0.0	33.35; acute zone,
300	91.57	10.0	529.0	33.0	330.0	0.263	371.5	0.0	58.74; axial vel 0.0152
323	73.39	10.0	897.0	33.0	330.0	0.167	585.8	0.0	88.71; trap level,
349	58.06	10.0	1433.9	33.0	330.0	0.118	831.3	0.0	129.4; surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 39.47 m

conc	dilutn	width	distnce	time					
(%)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(cm/s)	(m0.67/s2)	
0.11696	835.4	46.36	100.6	0.17	0.0	0.0	10.0	3.00E-4	

count: 1

;

3:34:39 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 3:32:00 PM

Case 1; ambient file C:\Plumes\Hartstene Run #6.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.3	90.0	29.7	7.8	0.0	0.0	0.3	90.0	0.0003
1.0	0.3	90.0	29.71	7.814	0.0	0.0	0.3	90.0	0.0003
5.0	0.3	90.0	29.75	7.87	0.0	0.0	0.3	90.0	0.0003
10.0	0.3	90.0	29.79	7.94	0.0	0.0	0.3	90.0	0.0003
15.0	0.3	90.0	29.84	8.009	0.0	0.0	0.3	90.0	0.0003
20.0	0.3	90.0	29.89	8.079	0.0	0.0	0.3	90.0	0.0003
25.0	0.3	90.0	29.93	8.149	0.0	0.0	0.3	90.0	0.0003
30.0	0.3	90.0	29.98	8.219	0.0	0.0	0.3	90.0	0.0003
35.0	0.3	90.0	30.03	8.288	0.0	0.0	0.3	90.0	0.0003
40.0	0.3	90.0	30.07	8.358	0.0	0.0	0.3	90.0	0.0003
43.0	0.3	90.0	30.1	8.4	0.0	0.0	0.3	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrnMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	3.713	0.0	10.62	100.0

Froude number: 42.21

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrnMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	30.0	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	30.0	4.039	33.0	330.0	98.04	1.02	0.0	0.0168; bottom hit,
100	130.0	30.0	25.08	33.0	330.0	13.8	7.1	0.0	4.846;
199	126.9	30.0	110.3	33.0	330.0	1.943	50.29	0.0	33.16; acute zone,
200	126.8	30.0	111.7	33.0	330.0	1.905	51.29	0.0	33.63;
206	126.3	30.0	120.4	33.0	330.0	1.692	57.76	0.0	36.54; merging,
300	96.44	30.0	764.4	33.0	330.0	0.263	371.5	0.0	169.2;
322	77.5	30.0	1211.1	33.0	330.0	0.17	574.3	0.0	262.6; trap level,
332	66.55	30.0	1495.7	33.0	330.0	0.14	700.0	0.0	335.7; chronic zone,
334	64.27	30.0	1560.5	33.0	330.0	0.134	728.3	0.0	355.9; surface,

Outside chronic zone

;

3:32:01 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 1:58:18 PM

Case 1; ambient file C:\Plumes\Hartstene Run #7.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.015	90.0	29.7	16.2	0.0	0.0	0.015	90.0	0.0003
1.0	0.015	90.0	29.71	16.13	0.0	0.0	0.015	90.0	0.0003
5.0	0.015	90.0	29.75	15.85	0.0	0.0	0.015	90.0	0.0003
10.0	0.015	90.0	29.79	15.5	0.0	0.0	0.015	90.0	0.0003
15.0	0.015	90.0	29.84	15.15	0.0	0.0	0.015	90.0	0.0003
20.0	0.015	90.0	29.89	14.8	0.0	0.0	0.015	90.0	0.0003
25.0	0.015	90.0	29.93	14.46	0.0	0.0	0.015	90.0	0.0003
30.0	0.015	90.0	29.98	14.11	0.0	0.0	0.015	90.0	0.0003
35.0	0.015	90.0	30.03	13.76	0.0	0.0	0.015	90.0	0.0003
40.0	0.015	90.0	30.07	13.41	0.0	0.0	0.015	90.0	0.0003
43.0	0.015	90.0	30.1	13.2	0.0	0.0	0.015	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	1.764	0.0	20.68	100.0

Froude number: 19.74

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrncMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	1.5	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	1.5	4.039	33.0	330.0	98.04	1.02	0.0	0.016; bottom hit,
100	129.7	1.5	27.84	33.0	330.0	13.8	7.095	0.0	5.017; axial vel 0.00198
200	116.5	1.5	97.42	33.0	330.0	2.567	38.05	0.0	20.38;
218	109.1	1.5	120.4	33.0	330.0	1.797	54.33	0.0	23.83; merging,
251	79.92	1.5	215.3	33.0	330.0	0.935	104.4	0.0	33.19; axial vel 0.00898 acute zone,
257	70.9	1.5	257.2	33.0	330.0	0.83	117.6	0.0	35.76; trap level,
275	50.7	1.5	544.3	33.0	330.0	0.678	144.1	0.0	42.77; begin overlap,
300	46.8	1.5	857.3	33.0	330.0	0.665	146.9	0.0	45.22;
341	45.44	1.5	1207.9	33.0	330.0	0.662	147.4	0.0	46.9; surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 33.73 m

conc	dilutn	width	distnce	time
(%)		(m)	(m)	(hrs)
0.4114	239.5	75.17	100.6	1.598

count: 1

;

1:58:19 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTONE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 1:47:30 PM

Case 1; ambient file C:\Plumes\Hartstone Run #8.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.1	90.0	29.7	16.2	0.0	0.0	0.1	90.0	0.0003
1.0	0.1	90.0	29.71	16.13	0.0	0.0	0.1	90.0	0.0003
5.0	0.1	90.0	29.75	15.85	0.0	0.0	0.1	90.0	0.0003
10.0	0.1	90.0	29.79	15.5	0.0	0.0	0.1	90.0	0.0003
15.0	0.1	90.0	29.84	15.15	0.0	0.0	0.1	90.0	0.0003
20.0	0.1	90.0	29.89	14.8	0.0	0.0	0.1	90.0	0.0003
25.0	0.1	90.0	29.93	14.46	0.0	0.0	0.1	90.0	0.0003
30.0	0.1	90.0	29.98	14.11	0.0	0.0	0.1	90.0	0.0003
35.0	0.1	90.0	30.03	13.76	0.0	0.0	0.1	90.0	0.0003
40.0	0.1	90.0	30.07	13.41	0.0	0.0	0.1	90.0	0.0003
43.0	0.1	90.0	30.1	13.2	0.0	0.0	0.1	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	0.534	0.0	20.68	100.0

Froude number: 5.976

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrncMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	10.0	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	10.0	4.039	33.0	330.0	98.04	1.02	0.0	0.0179; bottom hit,
100	128.9	10.0	20.66	33.0	330.0	13.8	7.095	0.0	4.049;
200	123.4	10.0	72.48	33.0	330.0	1.905	51.26	0.0	11.42;
244	119.2	10.0	120.7	33.0	330.0	0.797	122.5	0.0	17.48; merging,
290	110.9	10.0	265.2	33.0	330.0	0.321	304.5	0.0	33.05; axial vel 0.00567 acute zone,
300	108.0	10.0	326.3	33.0	330.0	0.263	371.2	0.0	39.41;
306	106.1	10.0	371.4	33.0	330.0	0.234	418.0	0.0	44.17; trap level,
344	99.32	10.0	613.2	33.0	330.0	0.154	633.1	0.0	79.63; local maximum rise or fall,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 18.62 m

conc	dilutn	width	distnce	time
(%)		(m)	(m)	(hrs)
0.14662	666.6	24.86	100.6	0.212

count: 1

;

1:47:31 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 2:05:39 PM

Case 1; ambient file C:\Plumes\Hartstene Run #9.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.3	90.0	29.7	16.2	0.0	0.0	0.3	90.0	0.0003
1.0	0.3	90.0	29.71	16.13	0.0	0.0	0.3	90.0	0.0003
5.0	0.3	90.0	29.75	15.85	0.0	0.0	0.3	90.0	0.0003
10.0	0.3	90.0	29.79	15.5	0.0	0.0	0.3	90.0	0.0003
15.0	0.3	90.0	29.84	15.15	0.0	0.0	0.3	90.0	0.0003
20.0	0.3	90.0	29.89	14.8	0.0	0.0	0.3	90.0	0.0003
25.0	0.3	90.0	29.93	14.46	0.0	0.0	0.3	90.0	0.0003
30.0	0.3	90.0	29.98	14.11	0.0	0.0	0.3	90.0	0.0003
35.0	0.3	90.0	30.03	13.76	0.0	0.0	0.3	90.0	0.0003
40.0	0.3	90.0	30.07	13.41	0.0	0.0	0.3	90.0	0.0003
43.0	0.3	90.0	30.1	13.2	0.0	0.0	0.3	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	1.764	0.0	20.68	100.0

Froude number: 19.74

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrncMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	30.0	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	30.0	4.039	33.0	330.0	98.04	1.02	0.0	0.0177; bottom hit,
100	129.8	30.0	22.46	33.0	330.0	13.8	7.095	0.0	4.794; axial vel 0.00247
200	126.5	30.0	83.66	33.0	330.0	1.905	51.26	0.0	25.05;
224	124.9	30.0	109.4	33.0	330.0	1.185	82.43	0.0	33.32; axial vel 0.00618 acute zone,
233	124.2	30.0	120.6	33.0	330.0	0.991	98.51	0.0	37.1; merging,
300	112.0	30.0	384.6	33.0	330.0	0.263	371.2	0.0	111.2;
306	109.9	30.0	433.3	33.0	330.0	0.234	418.0	0.0	126.4; trap level,
328	102.9	30.0	652.4	33.0	330.0	0.158	617.2	0.0	243.6; local maximum rise or fall,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 19.62 m

conc	dilutn	width	distnce	time					
(%)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(cm/s)	(m0.67/s2)	
0.15802	617.8	20.45	100.6	0.0244	0.0	0.0	30.0	3.00E-4	

count: 1

;

2:05:40 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 2:08:36 PM

Case 1; ambient file C:\Plumes\Hartstene Run #10.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.015	90.0	29.7	16.2	0.0	0.0	0.015	90.0	0.0003
1.0	0.015	90.0	29.71	16.13	0.0	0.0	0.015	90.0	0.0003
5.0	0.015	90.0	29.75	15.85	0.0	0.0	0.015	90.0	0.0003
10.0	0.015	90.0	29.79	15.5	0.0	0.0	0.015	90.0	0.0003
15.0	0.015	90.0	29.84	15.15	0.0	0.0	0.015	90.0	0.0003
20.0	0.015	90.0	29.89	14.8	0.0	0.0	0.015	90.0	0.0003
25.0	0.015	90.0	29.93	14.46	0.0	0.0	0.015	90.0	0.0003
30.0	0.015	90.0	29.98	14.11	0.0	0.0	0.015	90.0	0.0003
35.0	0.015	90.0	30.03	13.76	0.0	0.0	0.015	90.0	0.0003
40.0	0.015	90.0	30.07	13.41	0.0	0.0	0.015	90.0	0.0003
43.0	0.015	90.0	30.1	13.2	0.0	0.0	0.015	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrnMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	3.713	0.0	20.68	100.0

Froude number: 41.55

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrnMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	1.5	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	1.5	4.039	33.0	330.0	98.04	1.02	0.0	0.016; bottom hit,
100	129.9	1.5	28.19	33.0	330.0	13.8	7.095	0.0	5.053; axial vel 0.00411
185	124.1	1.5	120.4	33.0	330.0	2.884	33.87	0.0	25.37; merging,
200	120.4	1.5	138.6	33.0	330.0	2.422	40.33	0.0	30.04;
209	117.3	1.5	150.5	33.0	330.0	2.184	44.72	0.0	33.23; acute zone,
254	65.69	1.5	341.7	33.0	330.0	1.002	97.5	0.0	62.42; axial vel 0.0203 trap level,
272	43.14	1.5	637.9	33.0	330.0	0.843	115.8	0.0	74.7; begin overlap,
300	37.53	1.5	916.2	33.0	330.0	0.825	118.4	0.0	79.88;
314	36.49	1.5	1015.9	33.0	330.0	0.823	118.7	0.0	81.43; surface,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 28.85 m

conc	dilutn	width	distnce	time
(%)		(m)	(m)	(hrs)
0.51602	190.9	63.64	100.6	1.403

count: 1

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2:08:37 PM. amb fills: 2

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 2:11:55 PM

Case 1; ambient file C:\Plumes\Hartstene Run #11.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.1	90.0	29.7	16.2	0.0	0.0	0.1	90.0	0.0003
1.0	0.1	90.0	29.71	16.13	0.0	0.0	0.1	90.0	0.0003
5.0	0.1	90.0	29.75	15.85	0.0	0.0	0.1	90.0	0.0003
10.0	0.1	90.0	29.79	15.5	0.0	0.0	0.1	90.0	0.0003
15.0	0.1	90.0	29.84	15.15	0.0	0.0	0.1	90.0	0.0003
20.0	0.1	90.0	29.89	14.8	0.0	0.0	0.1	90.0	0.0003
25.0	0.1	90.0	29.93	14.46	0.0	0.0	0.1	90.0	0.0003
30.0	0.1	90.0	29.98	14.11	0.0	0.0	0.1	90.0	0.0003
35.0	0.1	90.0	30.03	13.76	0.0	0.0	0.1	90.0	0.0003
40.0	0.1	90.0	30.07	13.41	0.0	0.0	0.1	90.0	0.0003
43.0	0.1	90.0	30.1	13.2	0.0	0.0	0.1	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	0.998	0.0	20.68	100.0

Froude number: 11.17

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrncMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	10.0	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	10.0	4.039	33.0	330.0	98.04	1.02	0.0	0.0169; bottom hit,
100	129.4	10.0	24.01	33.0	330.0	13.8	7.095	0.0	4.76;
200	121.9	10.0	92.46	33.0	330.0	1.905	51.26	0.0	16.8;
222	119.1	10.0	121.0	33.0	330.0	1.232	79.23	0.0	20.46; merging,
263	109.9	10.0	251.5	33.0	330.0	0.547	178.4	0.0	33.33; acute zone,
289	99.68	10.0	450.9	33.0	330.0	0.327	298.6	0.0	50.21; axial vel 0.0112 trap level,
300	95.22	10.0	580.7	33.0	330.0	0.269	362.4	0.0	60.09;
332	90.41	10.0	808.7	33.0	330.0	0.213	459.4	0.0	82.56; begin overlap,
337	90.35	10.0	818.6	33.0	330.0	0.211	463.2	0.0	85.89; local maximum rise or fall,

Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 23.84 m

conc	dilutn	width	distnce	time
(%)		(m)	(m)	(hrs)
0.20434	478.1	30.59	100.6	0.207

(kg/kg) (s-1) (cm/s) (m0.67/s2)

count: 1

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FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

/ Windows UM3. 12/29/2004 2:14:46 PM

Case 1; ambient file C:\Plumes\Hartstene Run #12.001.db; Diffuser table record 1: -----

Depth	Amb-cur	Amb-dir	Amb-sal	Amb-tem	Amb-pol	Decay	Far-spd	Far-dir	Disprsn
m	m/s	deg	psu	C	kg/kg	s-1	m/s	deg	m0.67/s2
0.0	0.3	90.0	29.7	16.2	0.0	0.0	0.3	90.0	0.0003
1.0	0.3	90.0	29.71	16.13	0.0	0.0	0.3	90.0	0.0003
5.0	0.3	90.0	29.75	15.85	0.0	0.0	0.3	90.0	0.0003
10.0	0.3	90.0	29.79	15.5	0.0	0.0	0.3	90.0	0.0003
15.0	0.3	90.0	29.84	15.15	0.0	0.0	0.3	90.0	0.0003
20.0	0.3	90.0	29.89	14.8	0.0	0.0	0.3	90.0	0.0003
25.0	0.3	90.0	29.93	14.46	0.0	0.0	0.3	90.0	0.0003
30.0	0.3	90.0	29.98	14.11	0.0	0.0	0.3	90.0	0.0003
35.0	0.3	90.0	30.03	13.76	0.0	0.0	0.3	90.0	0.0003
40.0	0.3	90.0	30.07	13.41	0.0	0.0	0.3	90.0	0.0003
43.0	0.3	90.0	30.1	13.2	0.0	0.0	0.3	90.0	0.0003

P-dia	P-elev	V-angle	H-angle	Ports	Spacing	AcuteMZ	ChrncMZ	P-depth	Ttl-flo	Eff-sal	Temp	Polutnt
(in)	(ft)	(deg)	(deg)	()	(ft)	(ft)	(ft)	(ft)	(ft3/s)	(psu)	(C)	(%)
4.0	0.1	0.0	90.0	2.0	10.0	33.0	330.0	130.0	3.713	0.0	20.68	100.0

Froude number: 41.55

Step	Depth	Amb-cur	P-dia	AcuteMZ	ChrncMZ	Polutnt	Dilutn	x-posn	y-posn
	(ft)	(cm/s)	(in)	(ft)	(ft)	(%)	()	(ft)	(ft)
0	130.0	30.0	4.0	33.0	330.0	100.0	1.0	0.0	0.0;
1	130.0	30.0	4.039	33.0	330.0	98.04	1.02	0.0	0.0167; bottom hit,
100	130.0	30.0	25.07	33.0	330.0	13.8	7.095	0.0	4.844;
200	126.7	30.0	111.6	33.0	330.0	1.905	51.26	0.0	33.43; acute zone,
206	126.2	30.0	120.4	33.0	330.0	1.692	57.72	0.0	36.3; merging,
288	104.5	30.0	600.8	33.0	330.0	0.334	292.7	0.0	142.6; trap level,
300	97.76	30.0	777.0	33.0	330.0	0.263	371.2	0.0	189.8;
312	94.44	30.0	928.6	33.0	330.0	0.227	430.9	0.0	260.1; local maximum rise or fall,

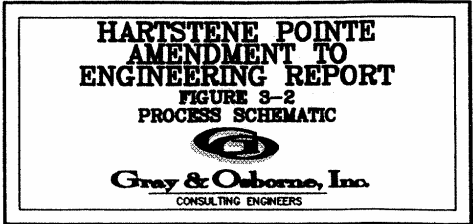
Const Eddy Diffusivity. Farfield dispersion based on wastefield width of 26.63 m

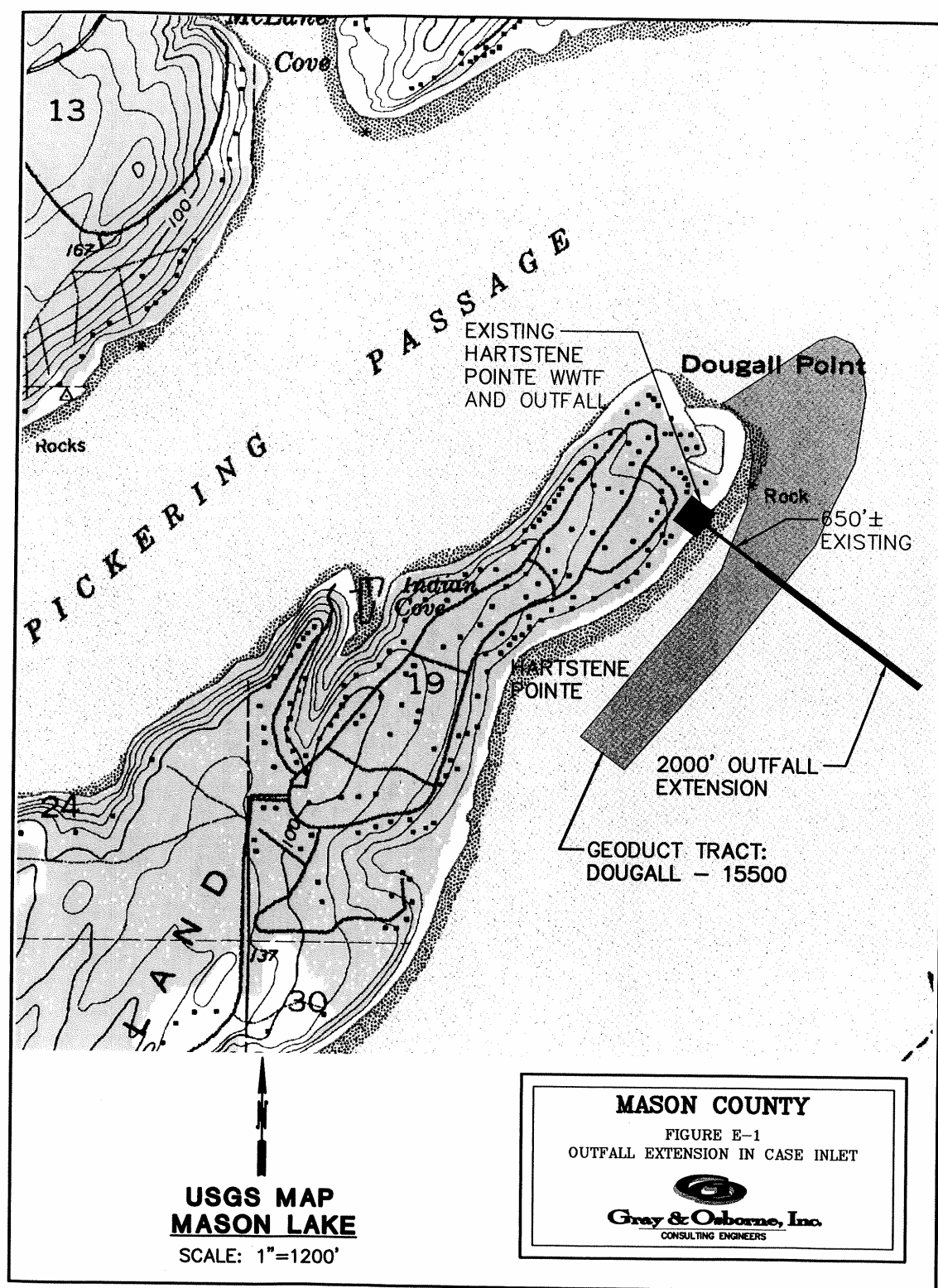
conc	dilutn	width	distnce	time					
(%)		(m)	(m)	(hrs)	(kg/kg)	(s-1)	(cm/s)	(m0.67/s2)	
0.22627	431.5	27.39	100.6	0.0197	0.0	0.0	30.0	3.00E-4	

count: 1

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2:14:47 PM. amb fills: 2





Page 44



APPENDIX D--RESPONSE TO COMMENTS

Comment From: Constance Ibsen, Citizen Member WRIA 14 Planning Unit

Comment:

Please give serious consideration to requiring nitrogen/phosphorus removal for this system.

It should be clear from the 303(d) listings and the problems in Pickering, Dana Passage, and whole of Puget Sound that nutrient loading is a problem. It is only a matter of time before this area in trouble.

Response:

The Department concurs that nutrient loading into the South Sound may present a problem over the coming years. The difficulty is that the agency does not currently have the tools to assess the potential far-field water quality impacts associated with nutrient discharges from this facility, nor has the agency developed a Total Daily Maximum Load (TMDL) for listings associated with nutrients in the South Sound. The agency is working on developing tools to help address this issue in cooperation with the University of Washington. More information on this effort is available at: <http://www.ecy.wa.gov/programs/eap/spasm/index.html>. Until this effort is complete, the Department is unable to assign water quality-based standards for nutrients for this facility.

Comments From: Tom Moore, Operations Program Manager

Comment:

A couple of items I have regarding our draft permit. First I would like to point out that Mason County is not a city. In your announcement of the availability of the draft permit for review, second paragraph, it states "The City of Mason County".

I also would like a clarification on Permit Section S-8. The county is currently working on the design of a new outfall extension. The project will be completed during the next permit cycle. Will final inspection of the outfall work and new diffuser suffice as compliance with this requirement? I'm guessing it would but please confirm this assumption.

I would also request that relief be granted with respect to the daily monitoring of fecal coliform. We propose a 5/week monitoring requirement which is a significant increase over the 1/week now in effect. Currently Mason County has one operator on duty on the weekends to serve three facilities. The current scheduled daily tasks and travel between facilities leave little time for any additional requirements.

Thank you for the opportunity to comment. I have passed this along to the plant operator and will forward his comments to you once he has had a chance to review it.

FACT SHEET FOR NPDES PERMIT WA0038377
MASON COUNTY--HARTSTENE POINTE WASTEWATER TREATMENT PLANT

Response:

First paragraph, the "City of Mason County" does not appear to be repeated in the permit or the fact sheet.

Second paragraph, regarding section S-8: the date of November 15, 2008, was intended to capture the final inspection after installation of outfall. Therefore, yes this section and date may be satisfied by the final inspection you suggest. If this date cannot be met because of construction delays, then you need to contact the Department before that date expires.

Third paragraph, regarding fecal coliform sampling. The daily fecal coliform monitoring does appear to be in error. We will change the permit to twice per week fecal coliform monitoring after the new outfall has been installed. The Department guidance is twice per week monitoring. We recommend that 5/week monitoring be used with the existing outfall.

Comments From: Frank Meriwether, Department of Health

Comment:

Thank you for the opportunity to review the draft permit and fact sheet for the Hartstene Pointe WWTP. The DOH Shellfish Program has a couple minor comments on the permit and fact sheet, as follows:

- Permit cover page. Cosmopolitan Engineering recently dove on the existing outfall and has current Lat/Longs for its location; but I don't know if these are the Lat/Longs listed on the cover page.
- Fact Sheet, P. 2. There is a reference to "Meriwether, 2004" but it is not listed on the References on P. 17.

Response:

The old Lat/Longs were from previous location efforts and should suffice until the new outfall is installed.

The reference will be corrected and added to include your report in the reference section.